

**Space Weather Highlights**  
**21 January - 27 January 2013**

**SWPC PRF 1952**  
**28 January 2013**

Solar activity has been at very low levels for the past week. At the beginning of the summary period, Region 1654 (N08, L=151 Class/Area Fki/1100 on 11 Jan) rotated off the west limb without producing any major activity. Region 1660 (N13, L=065 Class/area Dao/220 on 25 Jan) was the only other region of magnetic complexity on the visible disk. However, very little activity was attributed to Region 1660. The remaining regions on the disk remained stable and quiet. A couple of non-Earth directed CMEs were observed during the period. On 23 January, a large filament eruption was observed off the northeast quadrant of the visible disk. LASCO C2/C3 and STEREO A/B COR2 imagery supported an associated CME with this event. SWPC forecaster analysis and WSA-Enlil models runs indicated this event was Earth directed, however very little effects would be observed upon arrival.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was normal to moderate levels during the summary period.

Geomagnetic field activity was at mostly quiet levels from 21 -25 January. On 26 January, solar wind measurements from the ACE spacecraft indicated the arrival of a coronal hole high speed stream (CH HSS), preceded by a co-rotating interaction region (CIR). The ACE measurements showed a small increase in solar wind density, followed by an increase in solar wind speed, accompanied by an enhancement in the total interplanetary magnetic field. In response to these changes, quiet to active levels were observed. As effects from the CH HSS waned, a return to quiet levels was observed on 27 January. An instrument on the ACE spacecraft called the EPAM, used to monitor energetic protons and electrons in the solar wind, indicated the possible arrival of the 23 January CME late on 26 January. Due to the arrival of the CH HSS, it was hard to discern which effects can be attributed to the CH HSS and which can be attributed to the CME.

**Space Weather Outlook**  
**28 January - 23 February 2013**

Solar activity is expected to be very low levels with the possibility of C-class events for the entire forecast period. Even though several of the returning regions show magnetic complexity, very little data has indicated increases in activity while these regions rotate around the far side of the disk.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be normal to high levels on 28-30 January and 11-12 February in response to CH HSS effects. Normal to moderate levels are expected for the remainder of the period.

Geomagnetic field activity is expected to be at mostly quiet levels for the entire forecast period,



except for 09-10 February and 22-23 February. Quiet to active levels are expected on these days in response to CH HSS effects.



### ***Daily Solar Data***

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
21 January	108	50	180	B2.5	0	0	0	0	0	0	0	0
22 January	110	53	270	B2.6	0	0	0	1	0	0	0	0
23 January	105	68	340	B1.9	0	0	0	0	0	0	0	0
24 January	103	60	320	B1.6	0	0	0	0	0	0	0	0
25 January	101	44	300	B1.5	0	0	0	0	0	0	0	0
26 January	99	55	190	B1.4	0	0	0	0	0	0	0	0
27 January	98	60	150	B1.4	0	0	0	0	0	0	0	0

### ***Daily Particle Data***

Date	Proton Fluence (protons/cm <sup>2</sup> -day -sr)			Electron Fluence (electrons/cm <sup>2</sup> -day -sr)		
	>1 MeV	>10 MeV	>100 MeV	>0.6 MeV	>2MeV	>4 MeV
21 January	1.1e+05	1.1e+04	3.0e+03		1.2e+07	
22 January	1.0e+05	1.2e+04	3.0e+03		1.6e+07	
23 January	1.3e+05	1.2e+04	3.0e+03		1.9e+07	
24 January	1.5e+05	1.2e+04	2.9e+03		9.6e+06	
25 January	7.0e+05	1.2e+04	2.8e+03		1.1e+07	
26 January	3.3e+05	1.1e+04	2.7e+03		8.1e+05	
27 January	1.2e+05	1.1e+04	2.6e+03		2.0e+06	

### ***Daily Geomagnetic Data***

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
21 January	4	1-1-1-0-2-2-1-1	3	0-1-1-2-2-0-0-0	4	1-1-1-1-1-1-0-1
22 January	1	0-0-0-0-1-1-0-0	0	0-0-0-0-0-0-0-0	1	0-0-0-0-0-0-0-0
23 January	1	0-0-0-0-1-1-0-1	0	0-0-0-1-0-0-0-0	1	0-1-0-0-0-0-0-0
24 January	1	1-1-0-0-0-0-0-0	0	0-0-0-1-0-0-0-0	1	1-1-0-0-0-0-0-0
25 January	7	0-0-1-1-0-3-2-4	3	0-0-1-2-1-1-1-1	6	0-1-1-1-0-2-2-3
26 January	18	4-1-3-4-3-3-3-4	46	3-2-6-5-6-6-4-4	18	4-2-3-3-3-3-4-4
27 January	5	2-2-1-1-1-1-2-1	6	2-2-1-3-1-2-1-0	6	2-2-1-2-1-1-2-1

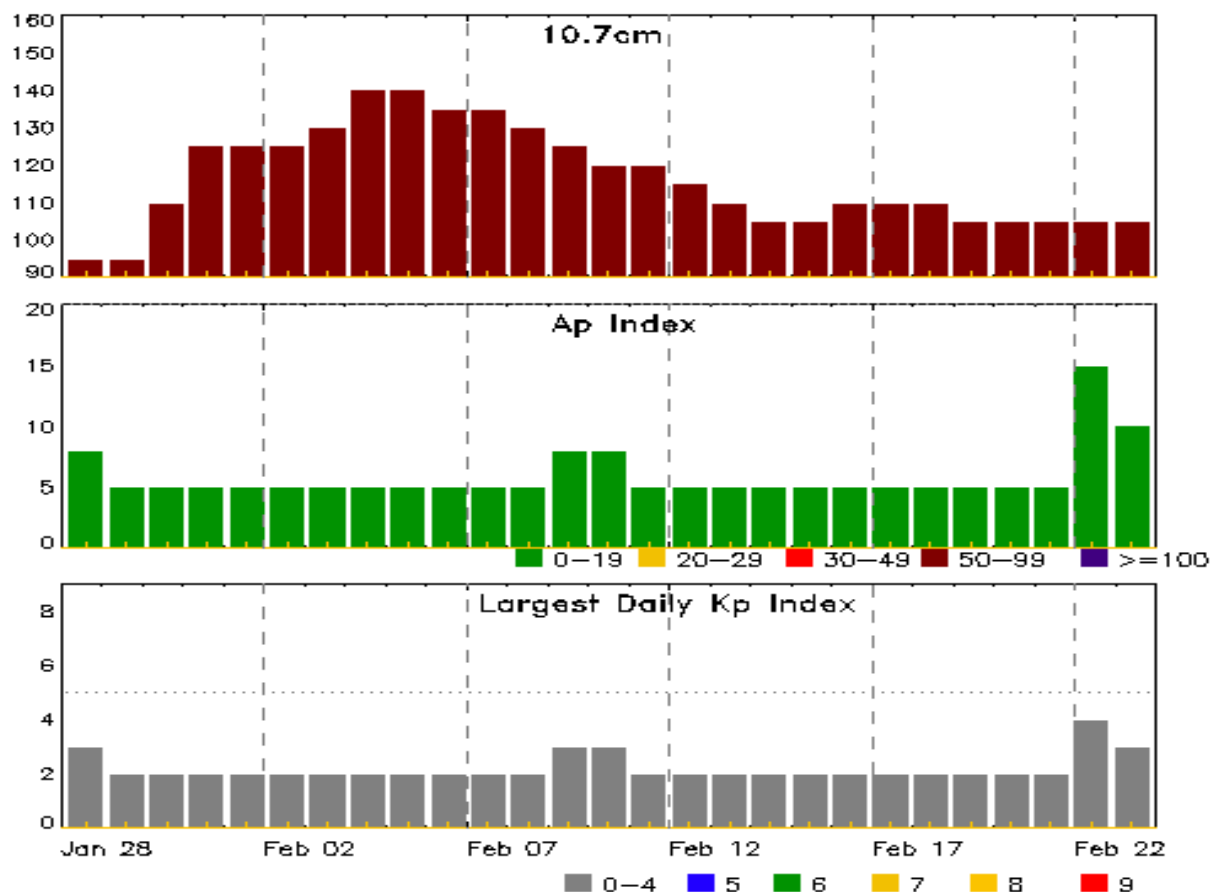


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
26 Jan 0000	WARNING: Geomagnetic K = 4	26/0001 - 1300
26 Jan 0136	ALERT: Geomagnetic K = 4	26/0132
26 Jan 1248	EXTENDED WARNING: Geomagnetic K = 4	26/0001 - 1800
26 Jan 1716	EXTENDED WARNING: Geomagnetic K = 4	26/0001 - 27/0300
27 Jan 0202	EXTENDED WARNING: Geomagnetic K = 4	26/0001 - 27/1300



## Twenty-seven Day Outlook



Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index
28 Jan	95	8	3	11 Feb	120	5	2
29	95	5	2	12	115	5	2
30	110	5	2	13	110	5	2
31	125	5	2	14	105	5	2
01 Feb	125	5	2	15	105	5	2
02	125	5	2	16	110	5	2
03	130	5	2	17	110	5	2
04	140	5	2	18	110	5	2
05	140	5	2	19	105	5	2
06	135	5	2	20	105	5	2
07	135	5	2	21	105	5	2
08	130	5	2	22	105	15	4
09	125	8	3	23	105	10	3
10	120	8	3				



### ***Energetic Events***

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	Half	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
			Max						245	2695	II	IV

**No Events Observed**

### ***Flare List***

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
21 Jan	0926	0930	0932	B4.7			1658
22 Jan	1026	1033	1042	B7.7	SF	N11W23	1660
22 Jan	2047	2120	2141	B5.8			1660
23 Jan	0031	0036	0041	B5.4			1660
23 Jan	0120	0127	0133	B6.5			1661
24 Jan	1616	1621	1625	B6.6			1661
25 Jan	0112	0127	0132	B3.4			1658
25 Jan	0825	0828	0833	B2.3			1660
25 Jan	1759	1803	1806	B2.3			1661
25 Jan	1938	1941	1945	B2.4			1661
25 Jan	2004	2031	2101	B5.9			1661
26 Jan	0257	0301	0303	B7.1			1660
26 Jan	0807	0823	0834	B5.5			1661



## Region Summary

Date	Location	Sunspot Characteristics						Flares							
	Lat CMD	Helio	Area 10 <sup>-6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
Region 1654															
08 Jan	N08E71	149	260	5	Hhx	2	A	1							
09 Jan	N10E60	148	350	14	Eki	15	B	2							
10 Jan	N08E47	147	770	16	Fki	21	BG	10			2				
11 Jan	N08E31	151	1100	17	Fki	36	BG	11	2		2	1			
12 Jan	N08E18	151	950	17	Fkc	31	BG	7			5				
13 Jan	N08E04	152	950	17	Fkc	31	BG	4			2				
14 Jan	N08W05	147	920	21	Fkc	49	BG	2			2				
15 Jan	N06W19	147	990	21	Fkc	45	BGD	3			2				
16 Jan	N06W33	149	590	21	Fkc	18	BGD								
17 Jan	N07W47	149	540	20	Fkc	27	BG								
18 Jan	N07W59	148	460	22	Fko	18	BG	3							
19 Jan	N07W73	149	360	22	Fko	11	BG	1							
20 Jan	N08W84	147	280	18	Fko	9	BG	1							
21 Jan	N09W88	144	10	3	Bxo	4	B								
								45	2	0	15	1	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 152

<b>Region 1656</b>															
11 Jan	N22E52	130	10		Axx	1	A								
12 Jan	N22E39	130	30	7	Cro	7	B								
13 Jan	N22E25	131	30	7	Cro	7	B								
14 Jan	N23E15	127	10	7	Bxo	4	B								
15 Jan	N22W00	128	10	1	Axx	1	A								
16 Jan	N22W14	130	10	1	Axx	1	A								
17 Jan	N21W28	131	plage												
18 Jan	N21W42	132	plage												
19 Jan	N21W56	133	plage												
20 Jan	N21W70	134	plage												
21 Jan	N21W84	134	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 128



### *Region Summary - continued*

Date	Location	Sunspot Characteristics						Flares							
	Lat CMD	Helio	Area 10 <sup>-6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
Region 1658															
13 Jan	S12E63	90	100	4	Cso	6	B								
14 Jan	S11E51	91	90	6	Cso	7	B								
15 Jan	S12E36	92	130	5	Cso	5	B								
16 Jan	S12E22	94	130	5	Cso	5	B								
17 Jan	S13E08	94	70	2	Hax	2	A								
18 Jan	S12W05	94	90	2	Hsx	3	A								
19 Jan	S13W19	95	70	2	Hsx	1	A								
20 Jan	S12W32	95	60	2	Hsx	1	A								
21 Jan	S12W46	96	70	2	Hsx	1	A								
22 Jan	S12W60	96	60	2	Hsx	1	A								
23 Jan	S12W73	96	60	2	Hsx	1	A								
24 Jan	S15W85	95	60	2	Hsx	1	A								
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 94

### **Region 1659**

17 Jan	N04E53	50	10	1	Bxo	3	B								
18 Jan	N04E40	50	10	3	Bxo	5	B								
19 Jan	N04E27	50	plage												
20 Jan	N04E12	52	plage												
21 Jan	N04W03	53	plage												
22 Jan	N04W18	55	plage												
23 Jan	N04W33	57	plage												
24 Jan	N04W48	59	plage												
25 Jan	N04W62	60	plage												
26 Jan	N04W76	61	plage												
								0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 53





### ***Region Summary - continued***

Date	Location		Sunspot Characteristics					Flares							
	Lat CMD	Helio Lon	Area 10 <sup>-6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
								C	M	X	S	1	2	3	4

#### ***Region 1660***

19 Jan	N11E12	64	50	4	Dso	4	B	1							
20 Jan	N13W02	65	70	5	Dao	8	B								
21 Jan	N12W15	65	100	7	Dai	15	BG								
22 Jan	N14W28	64	190	9	Dac	21	BG				1				
23 Jan	N13W42	65	200	10	Dai	25	BG								
24 Jan	N10W56	66	180	10	Dao	16	B								
25 Jan	N13W68	65	220	10	Dao	10	B								
26 Jan	N13W81	65	100	10	Dao	6	B								
								1	0	0	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 65

#### ***Region 1661***

22 Jan	N13E60	336	20		Hrx	1	A								
23 Jan	N13E56	333	20	1	Cso	1	B								
24 Jan	N17E33	336	20	1	Dso	2	B								
25 Jan	N15E20	337	30	3	Cro	3	B								
26 Jan	N15E08	337	30	5	Cro	5	B								
27 Jan	N15W06	337	30	5	Cro	5	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 337

#### ***Region 1662***

23 Jan	N26E64	319	60	1	Hsx	1	A								
24 Jan	N33E54	316	60	2	Hsx	1	A								
25 Jan	N28E41	316	50	2	Hsx	1	A								
26 Jan	N28E28	317	50	2	Hsx	1	A								
27 Jan	N28E14	317	50	2	Hsx	2	A								
								0	0	0	0	0	0	0	0

Still on Disk.

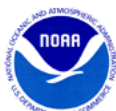
Absolute heliographic longitude: 317

#### ***Region 1663***

26 Jan	S10E46	299	10	3	Bxo	3	B								
27 Jan	S10E33	298	40	7	Dso	7	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 298



### ***Region Summary - continued***

Location		Sunspot Characteristics						Flares							
Date	Lat CMD	Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
		Lon	10 <sup>-6</sup> hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
		<i>Region 1664</i>													
27 Jan	N29W52	23	30	5	Cro	6	B	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 23

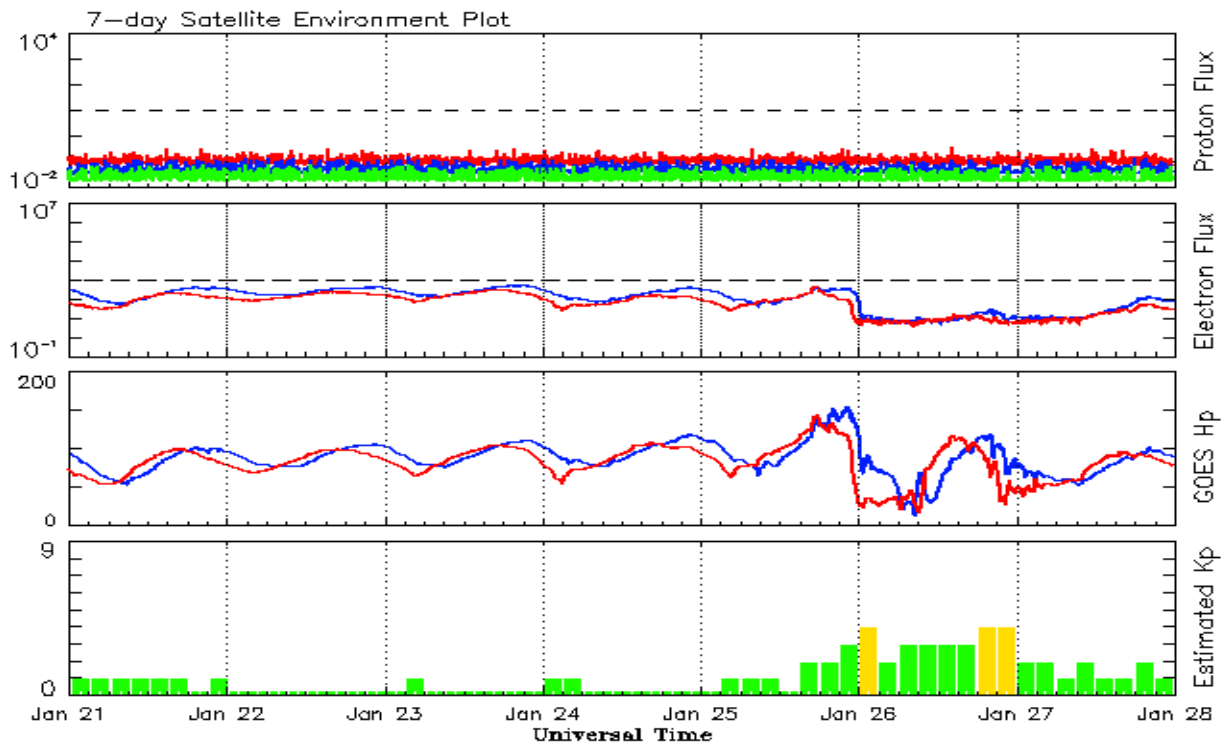


***Recent Solar Indices (preliminary)***  
***Observed monthly mean values***

Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		Penticton	Smooth	Planetary	Smooth
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
<b>2011</b>									
January	32.1	18.8	0.59	47.2	30.9	83.7	91.2	6	6.7
February	53.2	29.6	0.55	50.6	33.4	94.5	92.7	6	6.8
March	81.0	55.8	0.69	55.2	36.9	115.3	95.8	7	7.2
April	81.7	54.4	0.67	61.5	41.8	112.6	100.4	9	7.5
May	61.4	41.6	0.68	69.0	47.6	95.9	105.6	9	7.5
June	55.5	37.0	0.67	76.5	53.2	95.8	110.9	8	7.4
July	67.0	43.8	0.66	82.5	57.3	94.2	115.4	9	7.3
August	66.1	50.6	0.77	84.9	59.0	101.7	117.9	8	7.4
September	106.4	78.0	0.73	84.6	59.5	134.5	118.4	13	7.7
October	116.8	88.0	0.75	84.6	59.9	137.2	118.4	7	8.0
November	133.1	96.7	0.73	86.3	61.1	153.1	119.5	3	8.0
December	106.3	73.0	0.69	89.2	63.4	141.2	121.6	3	8.0
<b>2012</b>									
January	91.3	58.3	0.64	92.0	65.5	133.1	124.4	6	8.3
February	50.1	32.9	0.66	94.2	66.9	106.7	126.7	7	8.4
March	77.9	64.3	0.82	94.1	66.8	115.1	126.8	14	8.1
April	84.4	55.2	0.65	91.3	64.6	113.1	125.8	9	8.0
May	99.5	69.0	0.69	87.7	61.7	121.5	123.8	8	8.2
June	88.6	64.5	0.73	83.9	58.9	120.5	121.1	10	8.3
July	99.6	66.5	0.67			135.6		13	
August	85.8	63.1	0.74			115.7		7	
September	84.0	61.5	0.73			123.2		8	
October	73.5	53.3	0.73			123.3		9	
November	89.2	61.4	0.69			120.9		6	
December	60.4	40.8	0.68			108.4		3	

**Note:** Values are final except for the most recent 6 months which are considered preliminary.  
Cycle 24 started in Dec 2008 with an RI=1.7.





*Weekly Geosynchronous Satellite Environment Summary  
Week Beginning 21 January 2013*

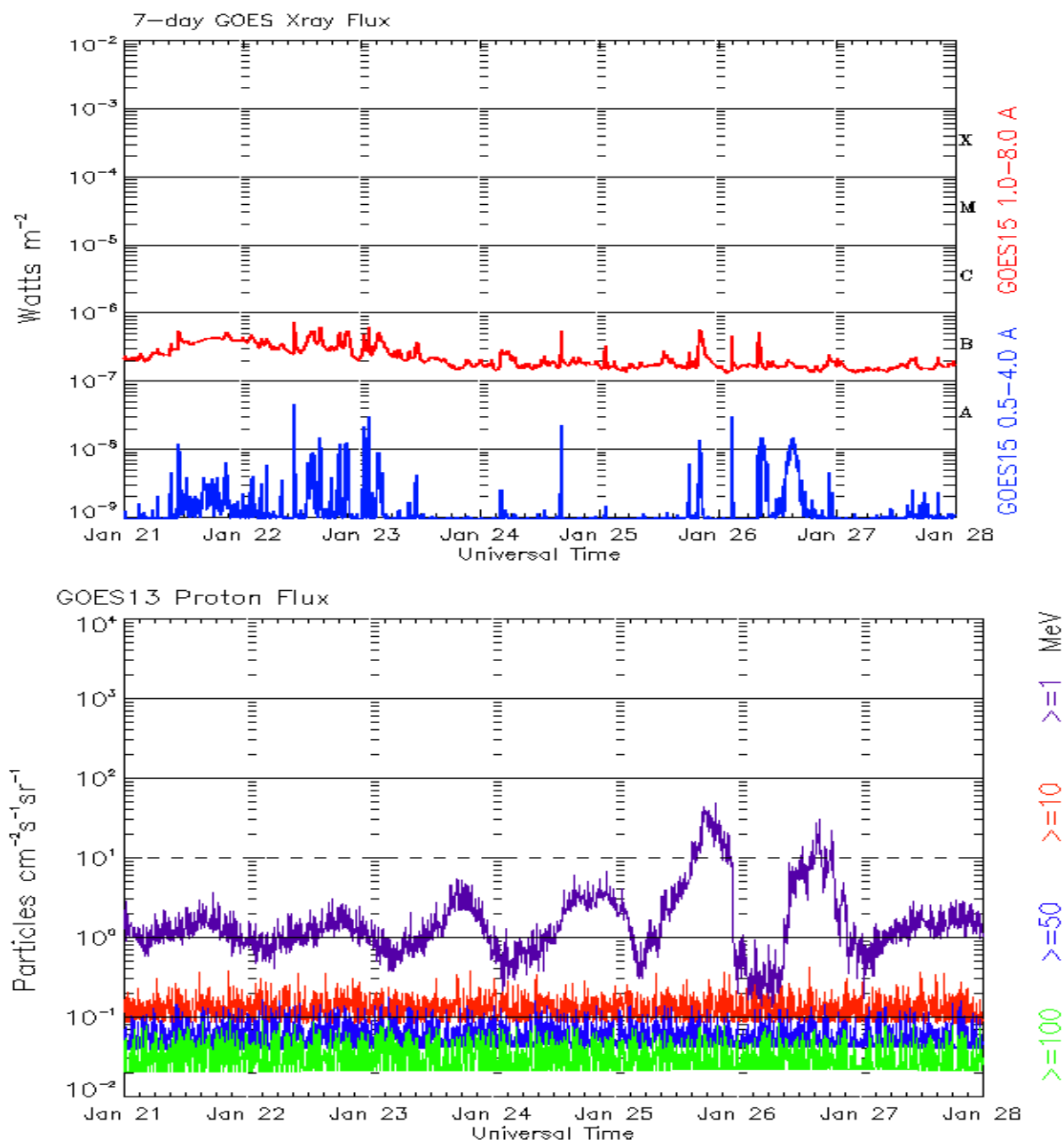
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as by the SWPC Primary GOES satellite. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

The data included here are those now available in real time at the SWPC and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and Kp are 'global' parameters that are applicable to a first order approximation over large areas. Hp parallel is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.



*Weekly GOES Satellite X-ray and Proton Plots  
Week Beginning 21 January 2013*

The x-ray plots contains five-minute averages x-ray flux ( $\text{Watt/m}^2$ ) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral flux units (pfu = protons/ $\text{cm}^2$  -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds:  $>1$ ,  $>10$ ,  $>30$ , and  $>100$  MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.



## ***Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)***

Published every Monday by the Space Weather Prediction Center.

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Space Weather Prediction Center  
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**Notice:** The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned.  
Comments and suggestions are welcome [SWPC.Webmaster@noaa.gov](mailto:SWPC.Webmaster@noaa.gov)

The Weekly has been published continuously since 1951 and is available online since 1997.

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[http://spaceweather.gov/weekly/Usr\\_guide.pdf](http://spaceweather.gov/weekly/Usr_guide.pdf) -- User Guide

